Loss / Near Loss (L/NL)

Loss/Near Loss ID : 503 **Status :** Closed

Short Description : FCC Operators Sprayed and burned with hot oil

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Loss Type : Loss

Actual Severity Classification (Loss Only) : Level 3a **Potential Severity Classification :** Level 3a

Location of Loss/Near Loss : Rich|Crack | FCC | Structure

Date/Time Occurred : 10/17/2010 10:30:00 PM

Date/Time Reported : 10/17/2010 11:40:00 PM

Process Safety Related Event : No

Type of Activity : Other

Loss/Near Loss Description : FCC Shutdown: During plant cleanup operations, while unlatching strainer box under V-102B coke strainer, hot oil sprayed out of the box onto two area operators, causing burns to both. One was transported to the hospital via ambulance. The other was treated at the clinic and released to work.

LPS Alert or Bulletin : No Alert/Bulletin Needed

Immediate Corrective Action Taken : One Operator was placed in safety shower and plant protection was summoned to the scene where they performed first aid and called for an ambulance. The other operator was taken to the clinic. Operations Supervisors and Head Operators met to determine what steps to take to prevent recurrence. All strainer boxes were removed to prevent pressure buildup.

Injury not OSHA-reportable to the Responsible Organization's Site : No

Address 1 :

Address 2 :

Address 3 :

City :

Country :

State/Province :

Zip/Postal Code :

Date Entered : 11/1/2010 7:59:47 AM

Entered By :

Required for Transportation (MVC) Losses

Weather : Cloudy

Temperature : 32 to <80 F (0 to <27 C)

Lighting : Night

Loss Subtypes

Loss

Injury/Illness

Loss of Containment

Loss / Near Loss (L/NL)

Responsibilities

Supervisor/Lead Responsible : HUFF, MICHAEL - HUFM

Management Sponsor : SMITH, RICK - SRAS

Injury/Illness Coordinator : CAMPION, JUNE - JUSM

Reported By : KEAVENY, EDWARD - EBKE

Consequences

ID	Type	Party Involved	Status
14	Injury/Illness		Closed
15	Injury/Illness		Closed
4008	Z For Metrics Only - Do Not Use		

Consequence - Injury/Illness

Note: Contact your OE Metrics representative if additional information is needed on this consequence.

Injury/Illness ID : **14**

Status : Closed

Third Party : No

On or Off the Job : On-the-Job

Chevron Classification : Days Away From Work

TSCA 8 © Allegation : No

Fatality : No

Medical Referral : Yes

Hospitalized Overnight : Yes

Treatment Other Than First Aid : Yes

Lost/Restricted Time

Lost Time	Estimated Days	Actual Days	Start Date
Days Away	180	106	10/18/2010 12:00:00 AM
Restricted Duty	100	135	2/1/2011 12:00:00 AM

Consequence - Injury/Illness

Note: Contact your OE Metrics representative if additional information is needed on this consequence.

Loss / Near Loss (L/NL)

Injury/Illness ID : **15**

Status : Closed

Third Party : No

On or Off the Job : On-the-Job

Chevron Classification : First Aid

TSCA 8 © Allegation : No

Fatality : No

Medical Referral : No

Hospitalized Overnight : No

Treatment Other Than First Aid : No

Consequence - Z For Metrics Only – Do Not Use

Loss of Containment (PSE) ID : 4008

PSE Tier Category : Tier 1

Location Function : Refining

Process System Identifier : Refining: FCC

Mode of Operation : Turnaround

Location Detail : FCC Operators Sprayed and burned with hot oil

Point of Release : Piping system above ground (piping, gaskets, site glasses, expansion joints, tubing, valves)

Maximum Release Rate per Hour : 0

Maximum Release Rate UOM : Barrels

PSE Community Response : Not Applicable

PSE Related Injury/Illness : T1: employee day(s) away from work injury(s)

LOPC Type of Material : Flammable

LOPC Location : Outdoor Release

LOPC Material Threshold Category : T1: Threshold Release Category 7

PSE Related Property Damages : Not Applicable

Release from Pressure Relief Device (PRD) : Not Applicable

PRD Release :

If PRD Release, Specify Material Threshold Category :

Loss / Near Loss (L/NL)

Journal (Loss/Near Loss)			
Personnel	**Date**	**Journal Note**	**Type**
GUTIERREZ, DARREL (DGFH)	1/30/2012 12:00:00 AM	Added new LOC Consequence	Sys Admin Comments

Investigation

Note: Investigation is marked as Sensitive/Commercial. Consult with your HES Manager if access to information is needed.

Investigation ID : **179**

Status : Closed

Investigation Date : 10/17/2010 12:00:00 AM

Type : TapRoot

Sensitive/Commercial : Yes

Solution/Action Item

Solution/Action Item ID : **8499**

Status : Closed

Source : Investigation

Source ID : 179

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Sensitive/Commercial : No

Root Cause : The cleanup for the Turnaround caused an unexpected and unanticipated volume of catalyst to plug the strainer baskets

Factor : G. Inadequate tools or equipment : 3-Equipment is not designed properly

Solution Type (user entered) : LPS: Organizational

Solution : Perform a design review of the strainer baskets on V-102s / V-105s / V-106s and implement any changes to ensure the design can handle not only normal operating conditions, but also:
conditions with higher than normal catalyst carryover and
turnaround and cleanup operating conditions

Date Assigned : 11/22/2010 12:00:00 AM

Due Date : 3/31/2011 12:00:00 AM

Completion Date : 1/25/2011 12:00:00 AM

Action Taken : 2 Reviews have been completed. 1st review in Late October. results were updating job aid to a procedure, cutting 4X6 slots in teh back of teh coke boxes so that no pressure can build up and valve extensions. A second review was done Jan. 17th with designs and operations. We are looking into another option to completely enclose the system. Implementation may take longer to resolve due to piping involved.

V&V Date : 7/18/2011 12:00:00 AM

Loss / Near Loss (L/NL)

V&V Comments : Temporty, inteim modification has been implemented. Thorough redesign will be implemented on next major TA in 2015

Person Responsible : MATERNE, MARK - MRMT

Supervisor/Lead Responsible : MCGREEVY, EVAN - MCGR

Journal (Action Item)

Created By	Date	Journal Note	Journal Type
FRYER, DOUGLAS (DTFR)	2/3/2011 3:26:06 PM	The final design review and ultimate field modifications have not been completed.	Workflow Enforced

Solution/Action Item

Solution/Action Item ID : 8512

Status : Closed

Source : Investigation

Source ID : 179

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Sensitive/Commercial : No

Root Cause : This is the first Turnaround where the strainer baskets were being used for cleaning the C-90 bottoms system strainers

Factor : E. Lack of or inadequate procedures : 4-Procedure/acceptable practice exists and technically right, but needs to be improved (improve clarity, cover additional scenario/steps, etc)

Solution Type (user entered) : LPS: Organizational

Solution : Revise the shutdown procedure (FCC-NP-3106) to address the steps needed to water wash through C-90 bottoms system and the strainer baskets associated with the Fractionator Bottoms Strainers as well as the P-105 Suction Strainers, and the hazards that may be associated with unanticipated and unexpected increased volume of catalyst in the strainer baskets. The revised procedure must also include a review of personal protective equipment and a discussion about appropriate precautionary actions.

Date Assigned : 11/22/2010 12:00:00 AM

Due Date : 3/31/2011 12:00:00 AM

Completion Date : 2/28/2011 12:00:00 AM

Action Taken : Additions are as follow from the back page of the procedure.

02/02/11 All 23085 Added safety precaution: Industry recommendation is to wear ....
Removed note: E-102's remain open to relief to drain bottoms reflux line.
Added substeps 24.1, 24.2, Warning and 24.3 to Drain Bottoms Reflux Loop step (24). Changed wording of step 24.
Added warning before step 26 page 14.
Added step 26 and substeps: Prepare to drain V-105s/V-106s/V-102s.
Added step 27 and substeps: Drain V-105s/V-106s/V-102s.
Added step 28.2 and substeps: Manifold V-105s for condensate removal.
The above updates to this procedure have been made to prevent future injuries to personnel.
THESE UPDATES CANNOT BE REMOVED IN THE FUTURE PER OSHA.

V&V Date : 3/31/2011 12:00:00 AM

V&V Comments : I confirmed the changes noted above were added to the procedure FCC-NP-3106. The warnings, in particular, will help to highlight the potential for a personnel exposure when cleaning th Frac Btms strainers.

Person Responsible : SALOMON, KARLA - KAJL

Supervisor/Lead Responsible : FRYER, DOUGLAS - DTFR

Solution/Action Item

Solution/Action Item ID : **8513**

Status : Closed

Source : Investigation

Source ID : 179

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Sensitive/Commercial : No

Root Cause : The current written Job Aid did not address the unexpected and unanticipated volume of catalyst to the strainer basket

Factor : E. Lack of or inadequate procedures : 1-Procedure does not exist or was not available for use (hard to access, etc)

Solution Type (user entered) : LPS: Organizational

Solution : Change the existing Job Aid to a Procedure that addresses routine as well as turnaround operations. The procedure will include a warning regarding the potential for catalyst carryover and the hazards associated with plugged strainer baskets.

Date Assigned : 11/22/2010 12:00:00 AM

Due Date : 1/31/2011 12:00:00 AM

Completion Date : 12/2/2010 12:00:00 AM

Action Taken : The job aide was turned into a procedure. NP 4315 for V-102 and V-106 and 4316 for V-106

V&V Date : 2/3/2011 12:00:00 AM

V&V Comments : Procedures were created to deal with strainer switches for the V-105's, V-102's and V-106's. These procedures include a warning with regards to plugging of bottoms strainer baskets during startups, shutdowns and upset conditions.

Person Responsible : SALOMON, KARLA - KAJL

Supervisor/Lead Responsible : FRYER, DOUGLAS - DTFR

Solution/Action Item

Solution/Action Item ID : **8514**

Status : Closed

Source : Investigation

Source ID : 179

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Sensitive/Commercial : No

Root Cause : Operations personnel indicated that during the last few months of the FCC run they noticed more plugging in the strainer baskets, due to an increased amount of catalyst present. There were several events where steam and hot vapors came out of the strainer baskets during routine cleaning. These events were not reported until after this incident

Factor : A. Lack of skill or knowledge : 2-Person was trained, but did not fully understand skill or knowledge. (Instruction needs improvement, practice or repetition needed, testing, etc)

Solution Type (user entered) : LPS: Organizational

Solution : Share the lessons learned from this incident and emphasize how changes in work conditions can pose additional risks

Date Assigned : 11/22/2010 12:00:00 AM

Due Date : 1/31/2011 12:00:00 AM

Completion Date : 12/31/2010 12:00:00 AM

Action Taken : The details of the incident and lessons learned were discussed with all Cracking operations personnel per Doug Fryer and the STL's. System wide bulletin was developed and shared inside and outside of the Refinery.

V&V Date : 1/20/2011 12:00:00 AM

V&V Comments : As the new RBM for Cracking, I meet with all the crews prior to startup at which I confirmed they have all discussed the incident and lessons learned. In addition they have reviewed the safety bulletin.

Person Responsible : POTTER, TIMOTHY - TAPO

Supervisor/Lead Responsible : POTTER, TIMOTHY - TAPO

Solution/Action Item

Solution/Action Item ID : **8515**

Status : Closed

Loss / Near Loss (L/NL)

Source : Investigation

Source ID : 179

Responsible Organization : MFG|RIC|Ops|Crkq ABU|B Crew(RICREF)

Sensitive/Commercial : No

Root Cause : Although expected by Refinery practices, operations personnel did not document near loss reports of similar incidents in the Richmond Refinery's Incident Reporting database

Factor : F. Inadequate communication of expectations regarding procedures or standards : 4-Communication by Management on expectations of usage of procedure or accepted practice needs improvement.

Solution Type (user entered) : LPS: Organizational

Solution : There are no separate Corrective Actions proposed for this Causal Factor the refinery is already engaged in steps to improve the near loss reporting system.

Date Assigned : 11/22/2010 12:00:00 AM

Due Date : 11/22/2010 12:00:00 AM

Completion Date : 11/22/2010 12:00:00 AM

Action Taken : The refinery is already engaged in steps to improve the near loss reporting system.

V&V Date : 11/22/2010 12:00:00 AM

V&V Comments : The refinery is already engaged in steps to improve the near loss reporting system - no separate action required

Person Responsible : BAER, MICHAEL - ABAE

Supervisor/Lead Responsible : BAER, MICHAEL - ABAE

Chevron

Memorandum

To Doug Fryer
Bruce Chinn
Mike Coyle

From Tim Potter / Mike Baer

Date 18 November 2010

Re Completed TapRooT® Investigation – IMPACT ERM #503

Event Title: Two operators burned during FCC cleanup

IMPACT Record Number(s): 503

PSM Event: No **PSM Near Miss:** No

RISO MCAR Event: No **RISO MCAR Near Miss:** No

1. **Incident Summary:**

   While unlatching the strainer basket under V-102B coke pot, wash water sprayed out of the strainer basket enclosure onto two operators. Both operators received burns and were treated on the scene by Chevron Fire Department (CFD) personnel. One operator was transported to the hospital via ambulance. The other operator was treated at the refinery clinic and released back to work. This employee subsequently entered a program that guarantees privacy.

2. **Initiating Event:**

   Wash water sprayed out of V-102B strainer basket enclosure onto two operators as they unlatched the strainer basket.

3. **Incident Description:**

   This incident took place while operators were cleaning up the C-90 bottoms system to prepare the FCC for a major turnaround. The operators were following the shutdown procedure that required oil washing, water washing and steaming the plant to prepare it for chemical cleaning. The C-90 bottoms system was under approximately 15# of steam pressure, which is the normal and expected pressure range while water washing and steaming this system.

   Operations personnel had already cleaned 7 of the 8 strainers in the C-90 bottoms system and the two operators were in the process of cleaning the last Fractionator Bottoms Strainer (V-102B). This cleaning procedure included steaming V-102B for approximately 30 minutes and blocking in the isolation valve at the bottom of V-102B. After steaming out V-102B and isolating the valve, they were unlatching the strainer basket under V-102B so they could remove the strainer basket. While unlatching the strainer basket, hot wash water sprayed from the strainer basket enclosure resulting in burns to both operators.

Chevron

The less seriously injured operator helped the other operator to the nearest safety shower. Operations personnel called CFD and CFD immediately responded to the scene. One operator was transported to the hospital via ambulance. The other operator was treated at the refinery's clinic, released back to work and subsequently entered into a program that guarantees privacy.

Post incident examination of the V-102B strainer basket showed that the strainer basket was plugged with a mixture of catalyst, water and oily residue. The investigation team was told that catalyst fines, when mixed with water, may form a paste. A paste-like material was found on the seating surfaces at the top of the strainer basket. The investigation team hypothesized that the paste-like material plugged the strainer basket and the strainer basket seating surfaces, and together with the steam pressure, allowed the wash water to spray out while the strainer basket was being unlatched.

The strainer baskets were installed on the Fractionator Bottoms Strainers (V-102A/B and V-106A/B) and P-105 Suction Strainers (V-105A/B/C/D) in 2005 to prevent coke from reaching the process sewer system, ensure compliance with environmental regulations, and ensure employee safety by preventing liquid from splashing up from the process sewer. This was the first turnaround where the strainer baskets were used to clean the C-90 bottoms system since the 2005 C-90 bottoms system redesign.

- V-102A/B and V-106A/B strainers are located on the discharge of the Fractionators Bottoms pumps. The four strainers are grouped in two parallel sets. Each strainer is capable of handling 50% of the flow from the Fractionator bottoms. In each set, routine operation entails having one strainer in service and the other strainer either being cleaned or in standby mode.
- V-105A/B/C/D strainers are located on the suction of the Fractionators Bottoms pumps. The four strainers are in parallel and grouped in two sets. Each strainer is capable of handling 50% of the flow from the Fractionator bottoms. In each set, routine operation entails having one strainer in service and the other strainer either being cleaned or in standby mode.

a. **On-Site Impact:** No additional on-site impact resulted from this incident.

b. **Off-Site Impact:** No off-site impacts resulted from this incident.

4. **What Went Well:**

The less seriously injured operator helped the other operator to the nearest safety shower. CFD was notified of the incident and immediately provided initial medical treatment to the injured operators.

5. **Immediate Corrective Actions:**

A Safety Stand-Down was held with the operating crew following this incident and the crew discussed the appropriate reaction to the situation and the need to be extra diligent once the cleanup process was resumed. No further action was required on V-102B and the strainer basket other than to clean up the area.

Chevron

6. Root Causes & Corrective Actions:

The Investigation Team identified five potential causal factors. These causal factors relate to:

- The cleanup for the Turnaround caused an unexpected and unanticipated volume of catalyst to plug the strainer baskets;
- This is the first Turnaround where the strainer baskets were being used for cleaning the C-90 bottoms system strainers;
- The current written Job Aid did not address the unexpected and unanticipated volume of catalyst to the strainer basket;
- Operations personnel indicated that during the last few months of the FCC run they noticed more plugging in the strainer baskets, due to an increased amount of catalyst present. There were several events where steam and hot vapors came out of the strainer baskets during routine cleaning. These events were not reported until after this incident;
- Although expected by Refinery practices, operations personnel did not document near loss reports of similar incidents in the Richmond Refinery's Incident Reporting database.

Each of these causal factors, as well as, additional considerations are covered below.

Causal Factor #1 - The cleanup for the Turnaround caused an unexpected and unanticipated volume of catalyst to plug the strainer baskets

The strainer baskets were designed to prevent coke from reaching the process sewer during routine operation. As noted above, this was the first time that the C-90 bottoms system was cleaned up for a turnaround since the strainer baskets were redesigned in 2005.

Root Cause Analysis

Applicable TapRooT question – *None* (identified as an Equipment Difficulty issue)

TapRooT Basic Cause Category – *Design*

TapRooT Near Root Cause Category – *Design Specifications*

TapRooT Root Cause Category – *Problem Not Anticipated – Equipment Environment Not Considered*

Corrective Action

Perform a design review of the strainer baskets on V-102s / V-105s / V-106s and implement any changes to ensure the design can handle not only routine operating conditions, but also:

- conditions with higher than routine catalyst carryover and
- turnaround and cleanup operating conditions.

Chevron

Causal Factor #2 - This is the first Turnaround where the strainer baskets were being used for cleaning the C-90 bottoms system strainers

This was considered a dual Causal Factor because of the design issue addressed in causal factor #1 and the turnaround clean up procedure (FCC-NP-3106) did not address the unexpected and unanticipated catalyst carryover through these vessels that can occur during a turnaround plant clean up.

Root Cause Analysis

Applicable TapRooT question – *Were policies, administrative controls, or procedures not used, missing, or in need of improvement*

TapRooT Basic Cause Category – *Procedures*

TapRooT Near Root Cause Category – *Procedures Missing*

TapRooT Root Cause Category – *Situation not covered*

Corrective Action

Revise the shutdown procedure (FCC-NP-3106) to address the steps needed to water wash through C-90 bottoms system and the strainer baskets associated with the Fractionator Bottoms Strainers as well as the P-105 Suction Strainers, and the hazards that may be associated with unanticipated and unexpected increased volume of catalyst in the strainer baskets. The revised procedure must also include a review of personal protective equipment and a discussion about appropriate precautionary actions.

Causal Factor #3 – The current written Job Aid did not address the unexpected and unanticipated volume of wash water and catalyst to the strainer basket

There was no separate training material for how to perform this task during turnaround conditions. Operators were used to switching and cleaning the Fractionator Bottoms Strainers as well as the P-105 Suction Strainers on a weekly basis under routine operating conditions. However, those conditions differed from those experienced by the operators while cleaning up the C-90 bottoms system to prepare for a major turnaround.

Root Cause Analysis

Applicable TapRooT question – *Were policies, administrative controls, or procedures not used, missing, or in need of improvement*

TapRooT Basic Cause Category – *Procedures*

TapRooT Near Root Cause Category – *Procedures Missing*

TapRooT Root Cause Category – *Situation not covered*

Corrective Action

Change the existing Job Aid to a Procedure that addresses routine as well as turnaround operations. The procedure will include a warning regarding the potential for catalyst carryover and the hazards associated with plugged strainer baskets. Additional corrective actions may be necessary depending

upon the Design Review proposed in Causal Factor #1 and should be covered in that Design Review.

Causal Factor #4 – Subsequent to the accident, operations personnel indicated that they had noticed during routine operation an increased amount of catalyst being collected in the strainer baskets and steam and hot vapor coming from the strainer baskets as they were being unlatched for routine cleaning since plant upsets earlier in 2010.

After this incident, Operators reported that they had seen more catalyst carryover when they were performing the routine duty of switching strainers during normal operations. These reports included examples of steam condensate and Light Cycle Oil (LCO) vapor coming from the strainer baskets as they were unlatched for routine cleaning. This should have been an indication to the operations personnel that conditions have changed and should have been shared with management to enable corrective adjustments.

Root Cause Analysis

Applicable TapRooT question – *Did the person need more skill or knowledge to perform the job or to respond to conditions or to understand system response?*

TapRooT Basic Cause Category – *Training*

TapRooT Near Root Cause Category – *Understanding Needs Improvement*

Corrective Action

Share the lessons learned from this incident and emphasize how changes in work conditions can pose additional risks.

The Corrective Actions proposed for Causal Factor #2 and #3 plus the steps that the Refinery is already taking to improve the near loss reporting system also address this Causal Factor.

Causal Factor #5 – Although expected by Refinery practices, operations personnel did not document near loss reports of similar incidents in the Richmond Refinery's Incident Reporting database.

Information obtained following the incident indicated there may have been previous close calls where the strainers had plugged before or where there was the potential for other operators to have come into contact with hot liquid. If these close calls were reported, then corrective actions could have been implemented to prevent similar incidents, including this one.

Root Cause Analysis

Applicable TapRooT question – *Had management been warned of this problem or had it happened before?*

TapRooT Basic Cause Category – *Management System*

Near Root Cause Category – *Standards, Policies, or Administrative Controls Need Improvement*

TapRooT Corrective Action

There is no separate corrective action proposed for this Causal Factor – the Refinery is already engaged in steps to improve the near loss reporting system.

7. **References & Attachments:**

Appendix I - Tap RooT® Events & Causal Factors Chart

Appendix II - RooT Cause Analysis®

8. **Additional Information:**

Investigation Team:

Name	Discipline / Role	Current Position
Tim Potter	Team Lead	B&S Area Business Manager
Mike Baer	TapRooT Facilitator	Safety / PSM Specialist
Tom DiPalma	Team Member	Safety Team Lead
Mark Materne	Team Member / Area SME	Maintenance Work Control
Ray Wiles	Team Member	USW Health and Safety Rep

Date & Time Event Began:

The incident happened on October 17, 2010 at 22:30.

Date & Time Investigation Started:

The incident investigation began after the injuries of October 17, 2010.

The investigation team met for the 1st time on October 18, 2010 at 14:00.

Type of Incident *(From II&R Matrix)*:

This was a level 3A incident – based upon the injuries to one employee.

Management Sponsor:

Doug Fryer (acting Area Business Manager)

Rick Smith (Cracking Section Head)

Tenets Compromised:

Tenet 2 – Always operate in a safe and controlled condition

Tenet 8 – Always address abnormal conditions

OE Processes Compromised:

Safe Operations

On Site Emergency Response:

Chevron Fire Department personnel were called and immediately provided initial treatment to the two injured operators.

Chevron

Agencies Notified, including time of Notifications:

Cal-OSHA was timely notified as a result of this incident at, or about, 07:20 on October 18, 2010.

Off-Site Emergency Response:

No off-site emergency response was required for this incident.

Communication Plan:

An LPS Alert has been issued for this incident.

An LPS Bulletin is required for this incident – corporate expectation for Level 3 incidents

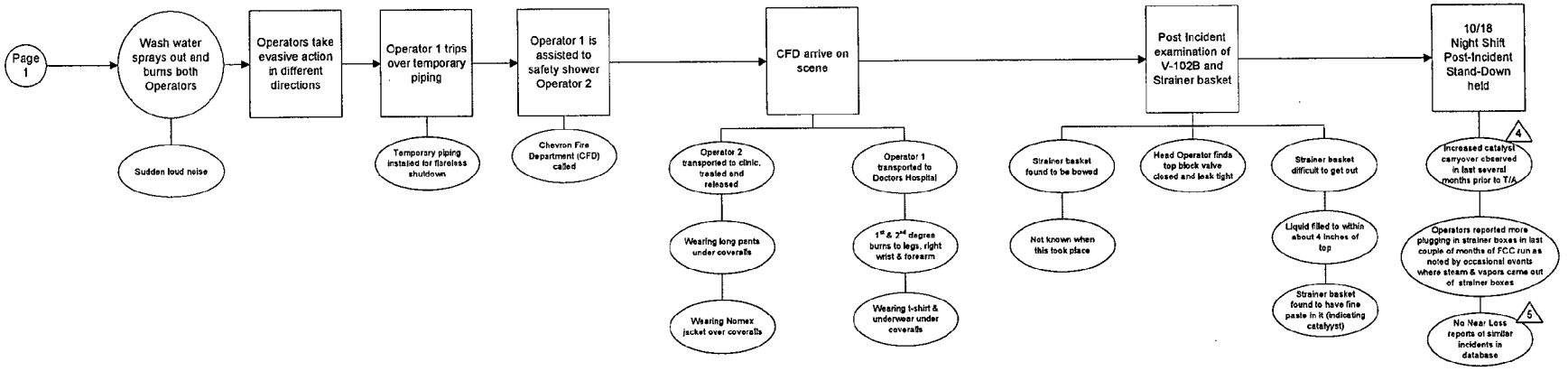
Report Approved by, Position & Date:

Mike Coyle, Refinery Manager, Nov 18, 2010

Cc: Investigation Team Members, HES Manager, Ref. Incident Coordinator, Ref. PSM Coordinator

Events and Causal Factors Chart

V-102B – Two Operators Sprayed with Hot Oil and Wash Water



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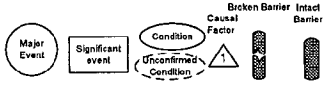

Chevron Richmond Refinery

Draft - Rev-Final

Date 11/18/10